Supply Chain Resilience:

The U.S. Ethanol Industry's Response to COVID-19

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Agricultural Outlook Forum
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2020 Began with Great Promise

- Policy/regulatory wins in late 2019
  - Restoring integrity to Renewable Fuel Standard
  - Removing E15 barriers and infrastructure grants
  - Ethanol/DDGS prioritized in trade negotiations
- Ratification of US-Mexico-Canada Agreement
- China “Phase 1” Agreement includes ethanol/DDGS
- Biofuel tax credits extended
- 10th Circuit Court decision limits RFS refiner waivers
- Strong outlook for U.S. and global economic growth

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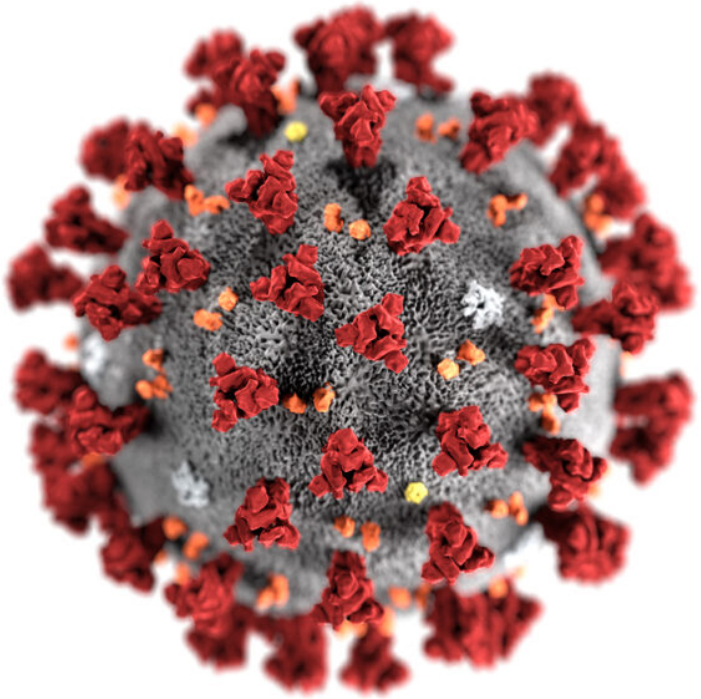
COVID-19 Changed Everything

Between March 20 and April 24:

- **48% collapse** in gasoline demand
  - 45% drop in ethanol blending
  - Record ethanol stocks levels
- **47% drop** in ethanol production
- In mid-April:
  - 75 plants completely idled
  - 73 plants at 50-90% nameplate capacity
  - 56 plants at 90%+ nameplate capacity
- Industry response to demand shock was **rapid** and **effective**



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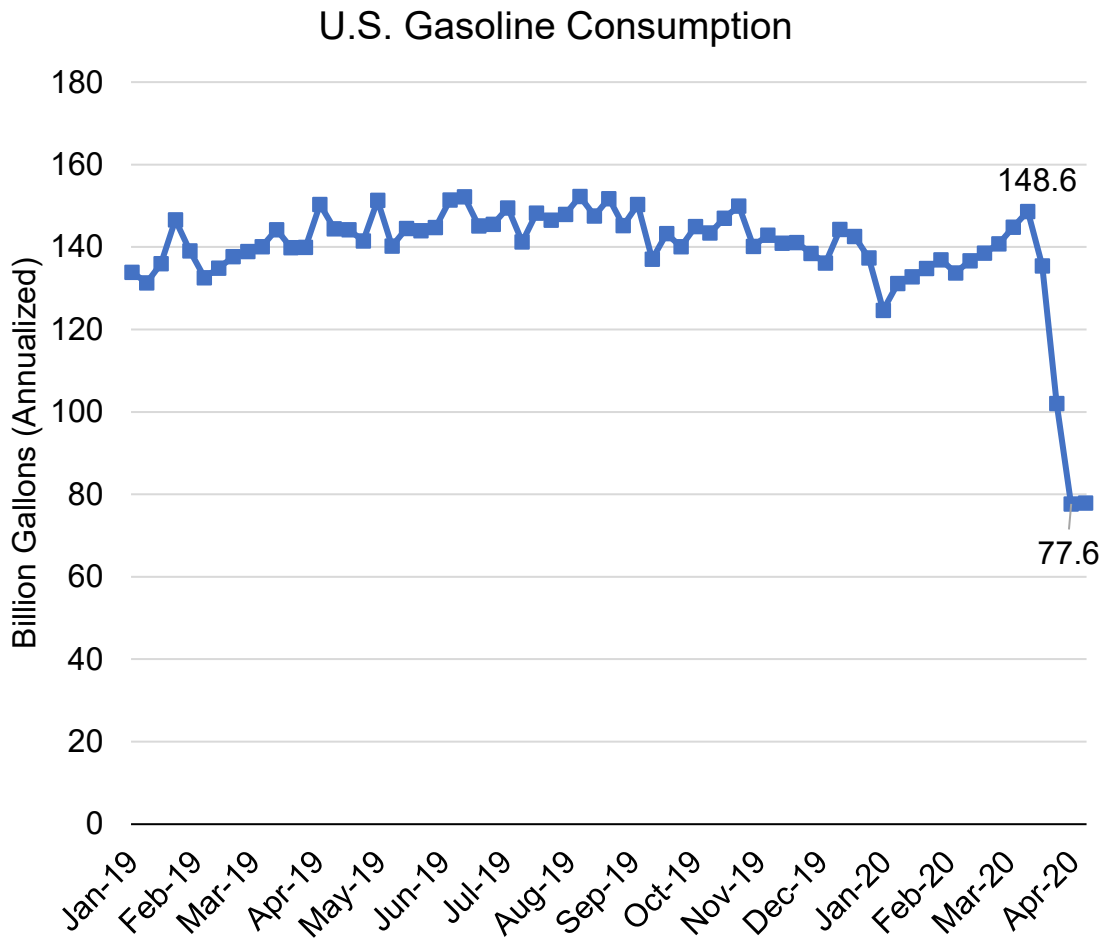
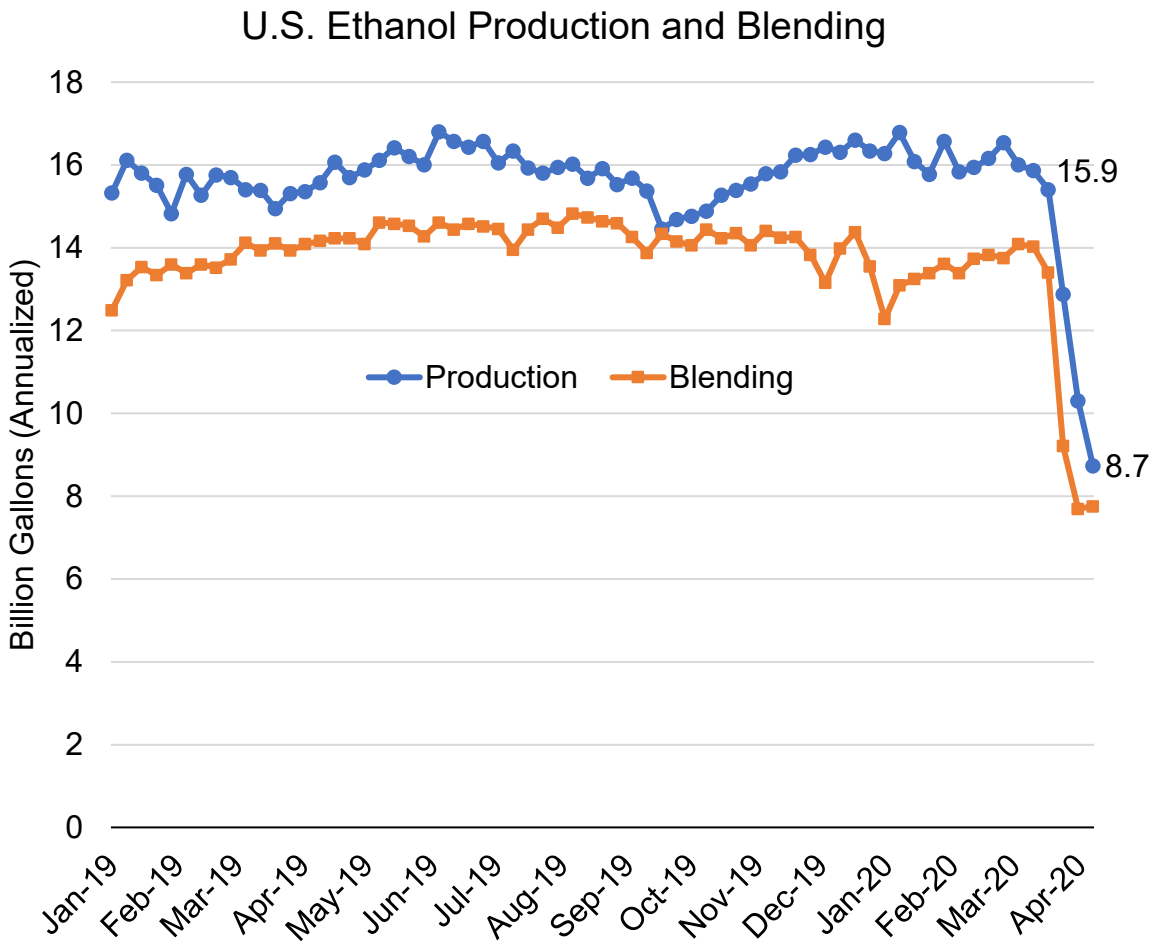
Market Response to COVID-19





Source: U.S. Energy Information Administration

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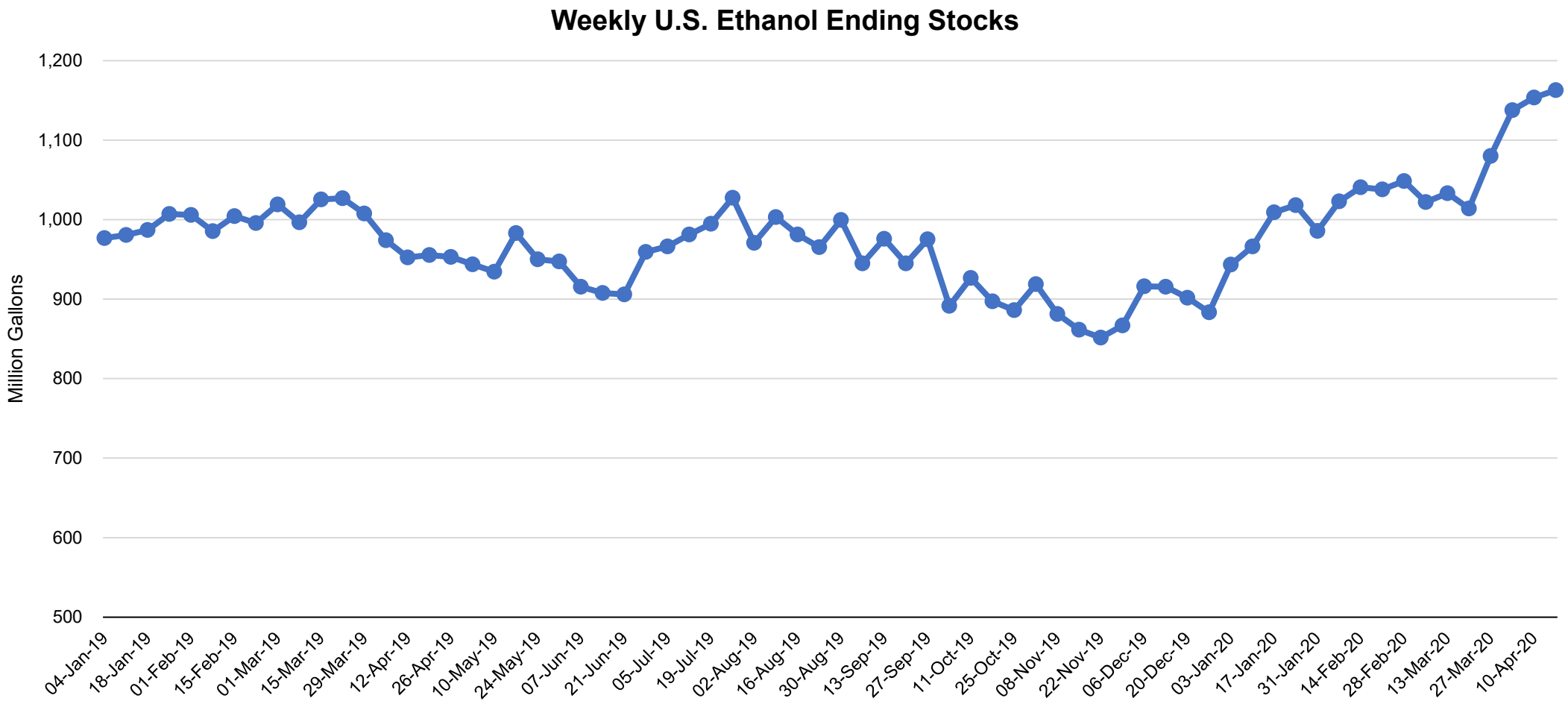
Market Response to COVID-19



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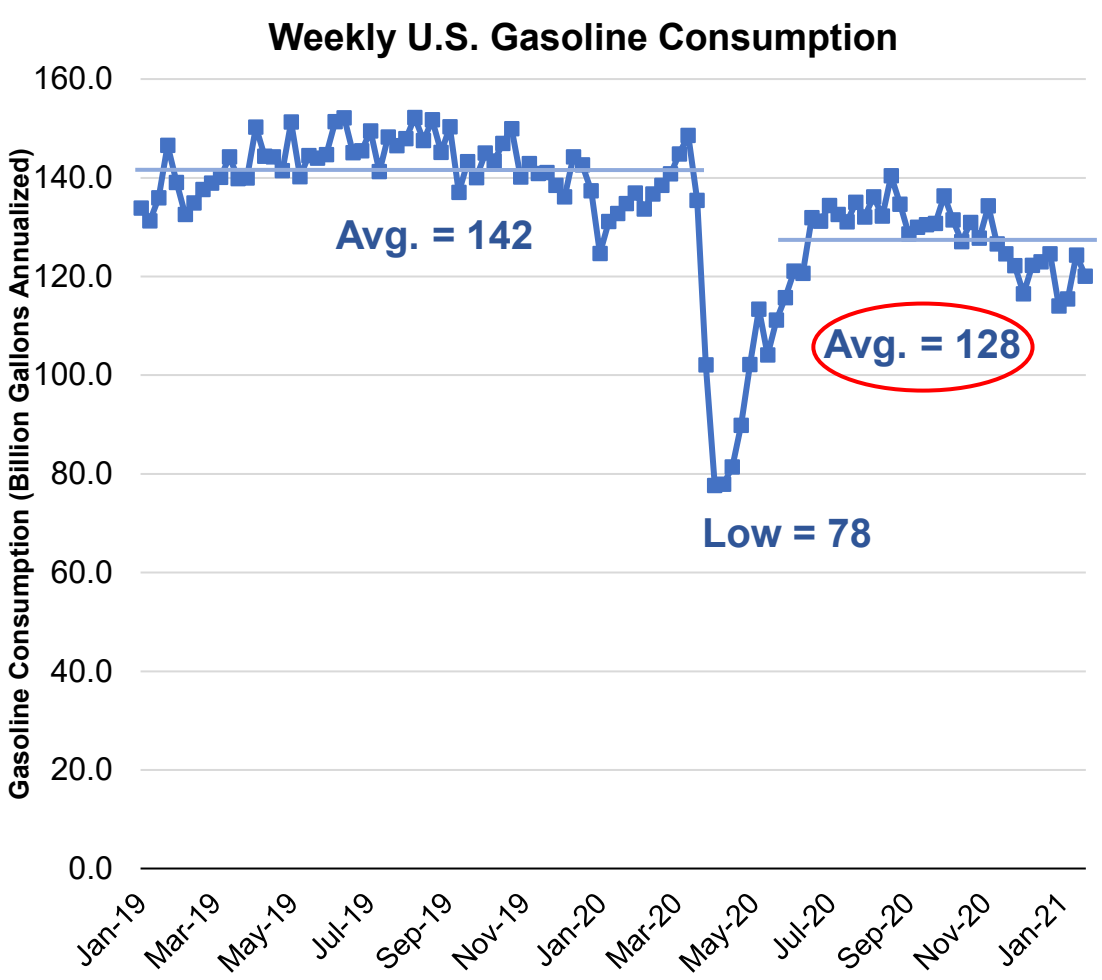
Recovering from COVID-19



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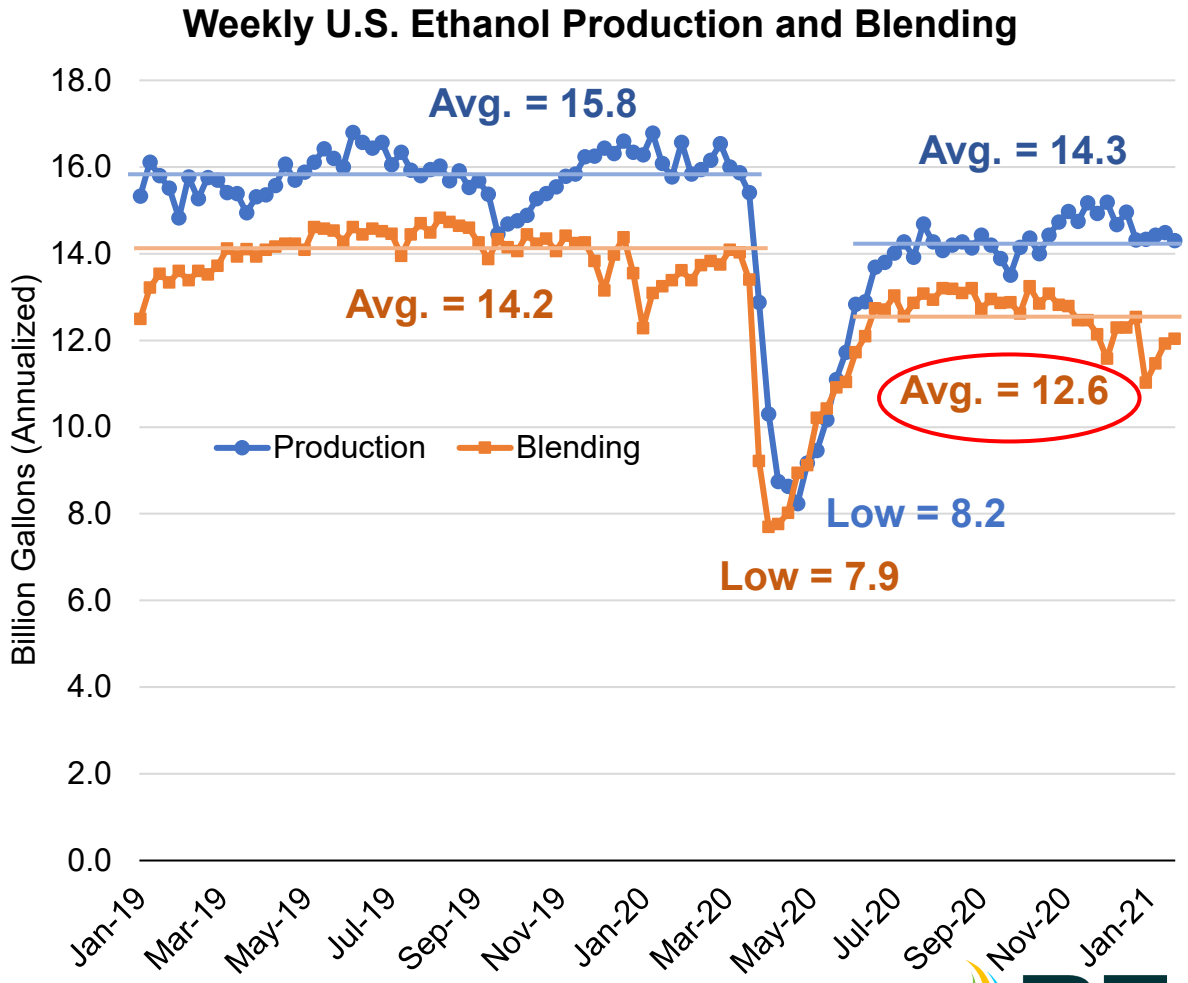

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COVID-19 Economic Impacts

- Despite effective & disciplined response, ethanol industry losses have been severe
  - 2020 gross revenue loss due to COVID-19 estimated at **$4-5 billion**
  - Combination of ~15% lower output (-2.5 BG) and lower prices
- Provisions providing emergency relief funding for ethanol were introduced in both the House and Senate, but not included in first three omnibus stimulus packages
  - Latest COVID package specifies that USDA may “make payments to producers of advanced biofuel, biomass-based diesel, cellulosic biofuel, conventional biofuel, or renewable fuel…produced in the United States, for unexpected market losses as a result of COVID-19.”

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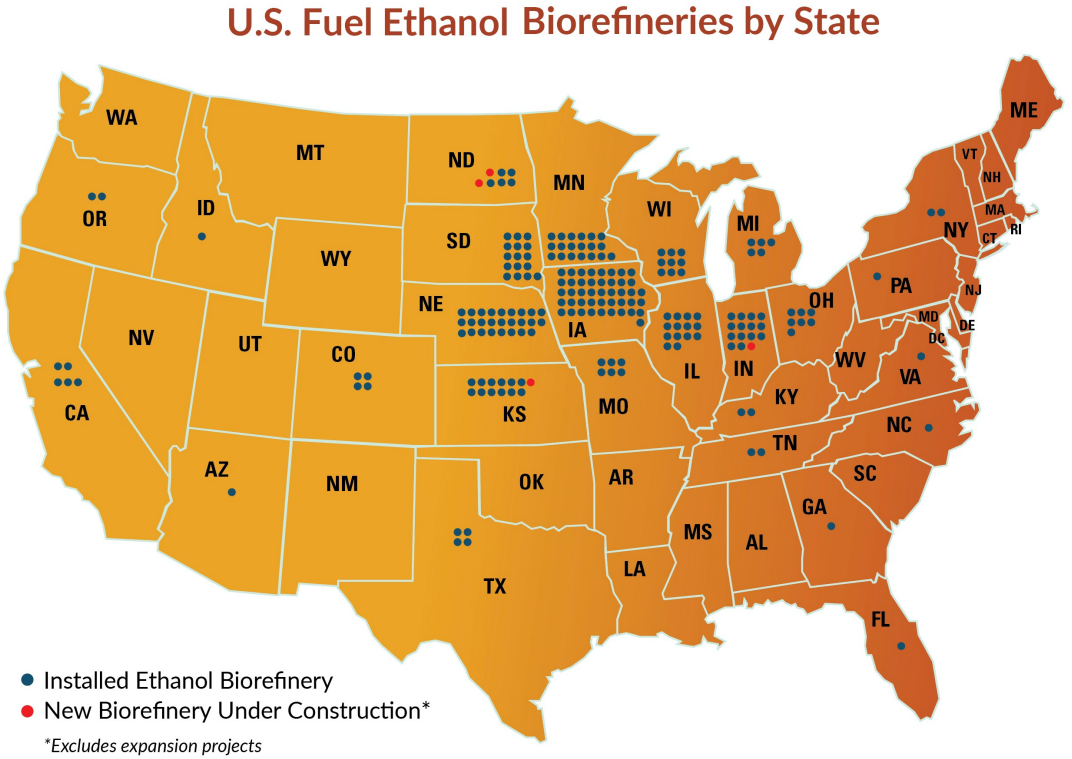
- **204** ethanol biorefineries in **26** states
- Capacity to produce:
  - **17.5** billion gallons (bg) of ethanol
  - **45-50** million metric tons of animal feed
  - **4-5** billion pounds of distillers oil
  - **6-7** billion pounds of captured CO_2



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On average,

1 bushel of corn

(56 pounds)

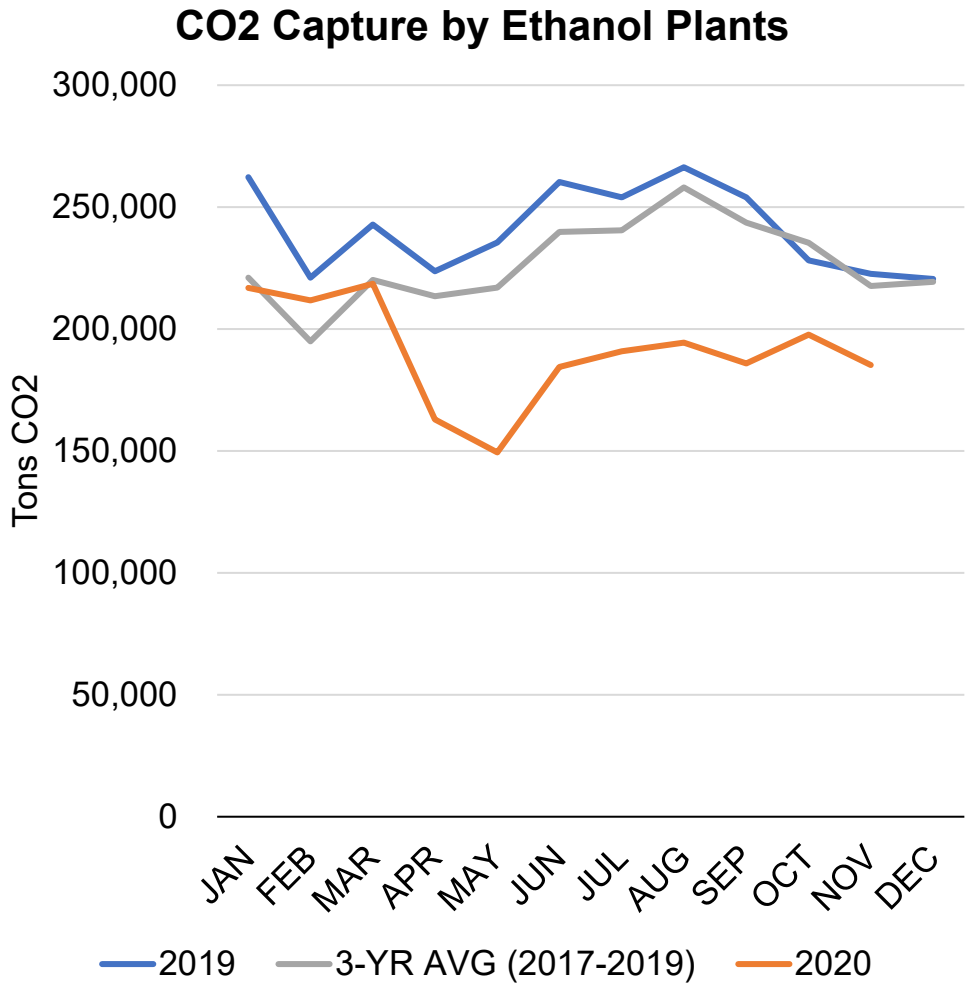
processed by a dry mill ethanol biorefinery produces:

- *2.92 gallons of denatured fuel ethanol*
- *15.86 pounds of distillers grains animal feed (10% moisture)*
- *0.80 pounds of corn distillers oil*
- *16.5 pounds of biogenic carbon dioxide*

Source: RFA

COVID-19 Response

- COVID-related reduction in ethanol output had ripple impacts:
  - Reduced CO2 and dry ice production
  - Reduced distillers grains output
  - Reduced distillers corn oil output
- Resiliency and creativity:
  - Emphasis on co-product yields
  - Significant increase in high-purity alcohol production for hand sanitizers and disinfectants
  - Increased focus on CO2 capture



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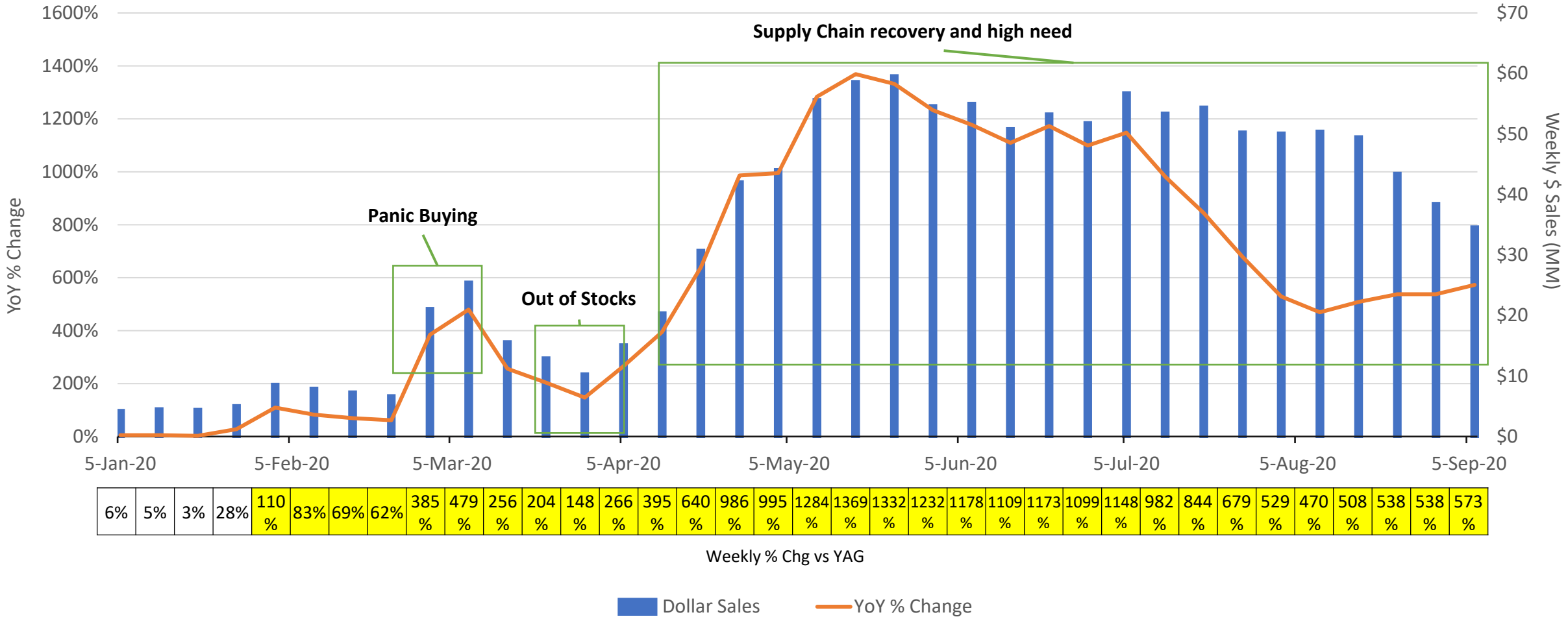
Hand Sanitizer Category: 2020 YTD Dollar Sales Trend

Initial spike in sales caused increased out of stocks in March resulting in a decline in distribution. Once supply chain recovered, consistent elevated levels of sales starting April continued on to end of modeling period



Source: Information Resources Inc. (IRI)
Actual data through 10/4/2020.

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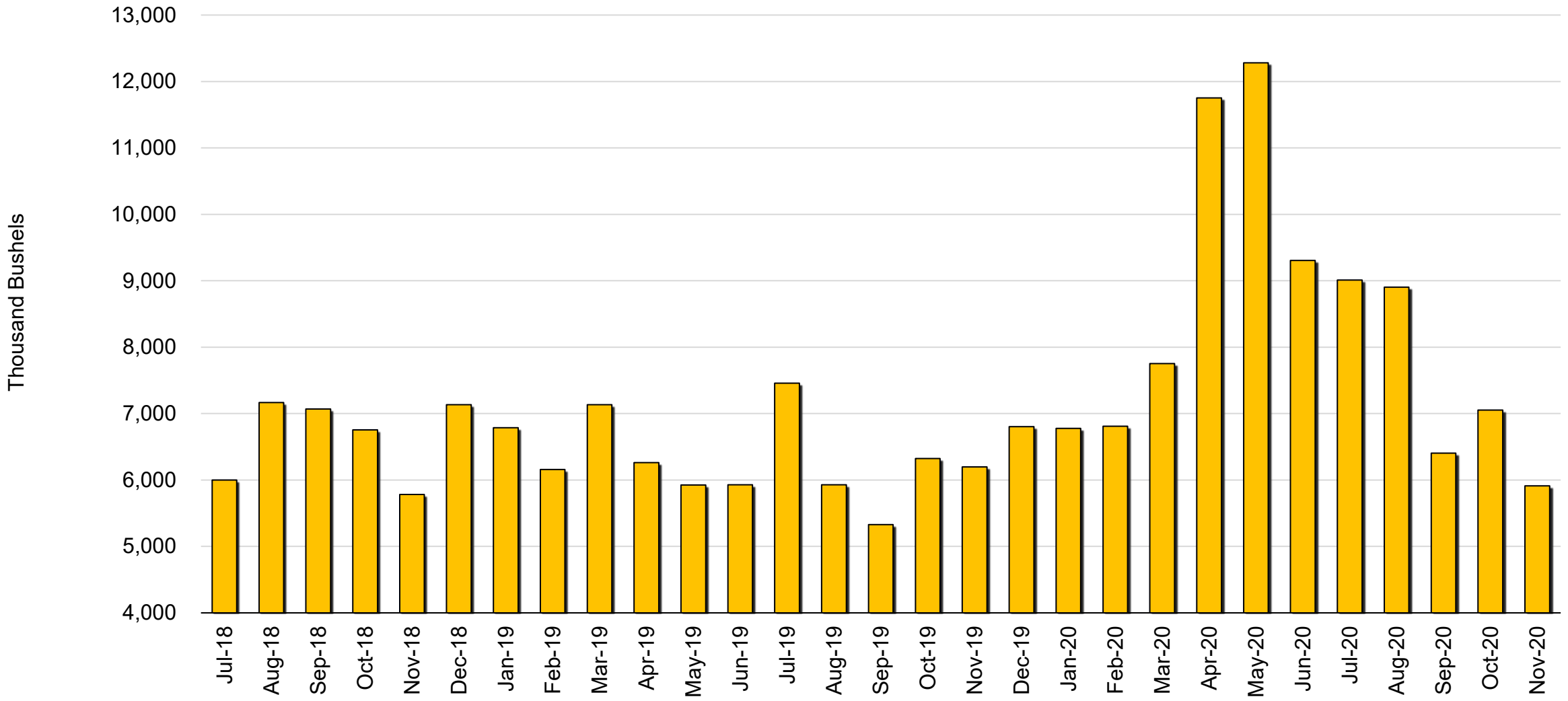
Monthly U.S. Grain Use for Industrial Alcohol Production



Source: U.S. Dept. of Agriculture

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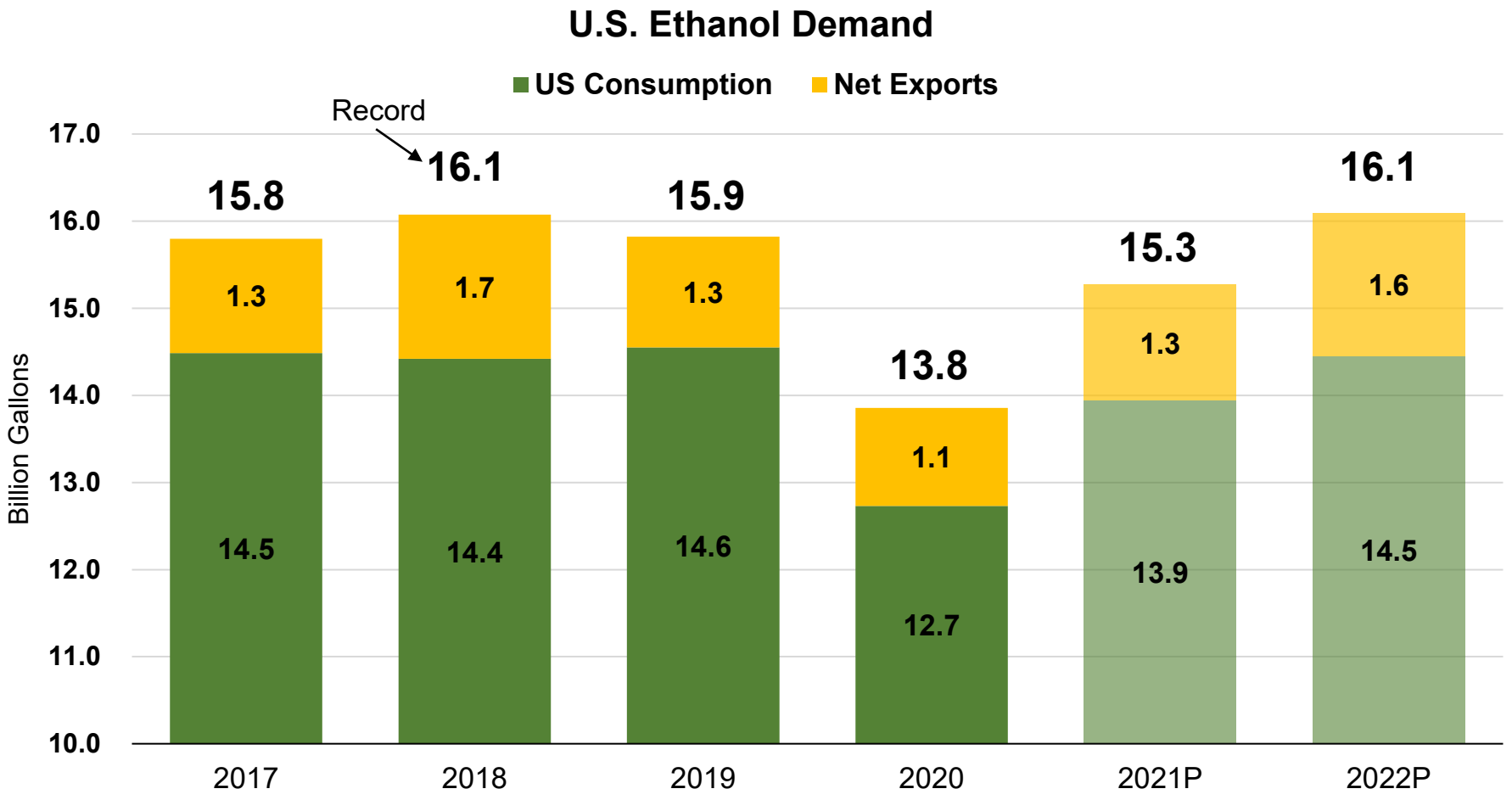
U.S. Ethanol Demand Recovery



Demand for U.S. ethanol unlikely to recover to peak pre-COVID levels until at least 2022.

Source: RFA calculations based on data and projections from U.S. Energy Information Administration, U.S. Census Bureau, and U.S. Department of Commerce; totals may not add due to rounding

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